

Claims

1. A microstructured optical fibre comprising a core region and a cladding region, the cladding region comprising
5 a plurality of structures, which have a first refractive index and are embedded in a solid matrix material having a second, different, refractive index, characterised in that the structures are helical along the fibre.
2. A fibre as claimed in claim 1, in which the helical
10 structures have a period that is sufficiently short that, in use, polarisation modes of light guided in the fibre are strongly coupled to each other.
3. A fibre as claimed in claim 2, in which the helical structures have a period that is sufficiently short that a
15 birefringence effect in the fibre is reduced.
4. A fibre as claimed in claim 3, in which the helical structures have a period that is sufficiently short that the fibre exhibits substantially no birefringence effects.
5. A fibre as claimed in claim 1, in which the helical
20 structures have a period that is sufficiently long that there is substantially no coupling between polarisation modes of the fibre.
6. A fibre as claimed in any preceding claim, in which the helical structures are regions of a dielectric material that
25 extend unbroken along their respective helices for at least one period of the helical structure.
7. A fibre as claimed in claim 6, in which the regions of the dielectric material extend unbroken along the length of the fibre.
8. A fibre as claimed in any of claims 1 to 5, in which
30 the helical structures are regions of a dielectric material that are discontinuous along their respective helices.
9. A fibre as claimed in claim 8, in which the regions of the dielectric material are discontinuous within one period
35 of the helical structure.

10. A fibre as claimed in claim 9, in which the regions of the dielectric material are of a length that is less than ten times their diameter.
11. A fibre as claimed in claim 10, in which the regions of the dielectric material are of a length that is of the same order of magnitude as their diameter.
12. A fibre as claimed in claim 11, in which the regions of the dielectric material are at least approximately of the same length as their diameter.
13. A method of manufacturing a microstructured optical fibre, comprising: (i) forming a preform arranged to form a core region and a cladding region in the fibre, the cladding region comprising a plurality of structures having a first refractive index and embedded in a solid matrix material having a second refractive index; (ii) heating the preform; and (iii) drawing the fibre from the preform; characterised in that the preform and fibre are rotated relative to each other during the drawing such that the structures in the cladding region of the drawn fibre extend helically along the drawn fibre.
14. A method as claimed in claim 13, in which the preform is rotated and the fibre is not rotated.
15. A method as claimed in claim 13, in which the fibre is rotated and the preform is not rotated.
16. A method as claimed in any of claims 13 to 15, in which the preform and fibre are rotated relative to each other sufficiently quickly that the helical structures have a period that is sufficiently short that, in use, polarisation modes of light guided in the fibre are coupled to each other.
17. A method as claimed in any of claims 13 to 15, in which the preform and fibre are rotated relative to each other sufficiently quickly that the helical structures break up and become discontinuous along their respective helices.

18. A method as claimed in any of claims 13 to 15,
comprising the step of propagating an acoustic wave through
the fibre and/or preform to enhance break-up of the helical
structures into structures that are discontinuous along
5 their respective helices.
19. A method as claimed in any of claims 13 to 15, in which
the preform and fibre are rotated relative to each other
sufficiently slowly that the helical structures have a
period that is sufficiently long that there is substantially
10 no coupling between polarisation modes of the fibre.
20. A method as claimed in any of claims 1 to 19, in which
the preform is formed from a bundle of rods and/or tubes.